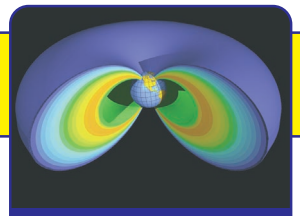


GEM Inner Magnetosphere Storms Campaign

Goals and Strategy

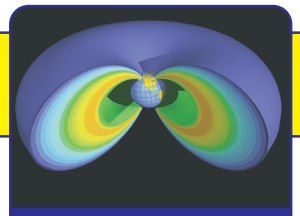
Overall Goal

Specification of the ***scope*** of and ***requirements*** for an Inner Magnetosphere Module for the GGCM

We anticipate that the IM-Module will be composed of a set of coupled and/or interdependent models which supplement the GGCM spine

Strategy

1) Identify key physics issues
2) Conduct individual observational and theoretical studies of key issues
3) Test knowledge and models against selected storm events
4) Extend to new events to test specific processes
5) Make reduced models and/or detailed outputs widely available
6) Couple sets of models in hierarchical and/or interdependent modes



GEM Inner Magnetosphere Storms Campaign

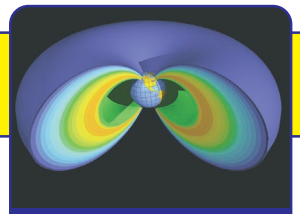
WG2: Radiation Belts

Three Principal Objectives

1) To evaluate the relative contribution of various proposed acceleration and loss processes through theory, modeling, and comparison with data

2) To create time-dependent phase space density profiles of the radiation belts that will more accurately represent their structure and dynamics than fixed energy profiles

3) To define and specify the specific requirements for a Radiation Belt module



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Specific Requirements for RB Module

- Develop a phenomenological description for the "common elements" of radiation belt events

  e.g. Dst effect,
  phase space density gradients,
  spectral evolution,
  flux characteristics at 6.6 vs. 4.2, etc.

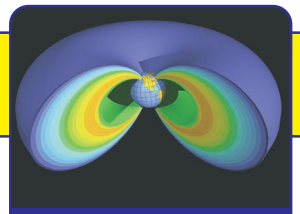
- Define the range of variation that needs to be explained

  e.g. different penetration depth of RB particles,
  taxonomy of different "classes" of events

- Document to the extent possible the causes or potential causes for each characteristic and/or variation

  e.g. shock acceleration present in some events

- Could form the basis for a "Challenge" for models and theory



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Accomplishments

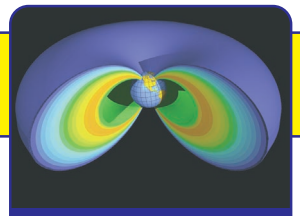
- Publications
  At least 6 papers submitted

  Three Theses completed (Elkington, Kim, Goldstein)

- Several new observational studies of phase space density
  - Directly addresses goal 2 of the WG2
  - Brings Theory and Observations much closer together
  - some questions still outstanding (e.g. possible peak)
  - still need better B field information (e.g. Dst Effect)

- Very successful reproduction of Geosynchronous electron fluxes using only *fixed* solar wind input

- New developments in theoretical understanding of relativistic diffusion equations and wave/particle interactions



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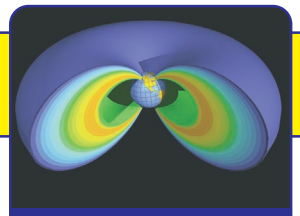
Action Items

- Develop a “Challenge” to be issued next summer
  - reproduce the common phenomenology of RB events and account for the variations seen from event to event
  - reproduce Space Weather metric (e.g. Geo Flux) possibly a NOAA space weather challenge instead
- Investigate a CEDAR-GEM-SHINE Yosemite meeting (Thorne)
- Invited speaker on wave/particle interactions and wave observations for the GEM storms for next summer (Chan)
- Investigate GRL Special Issue on GEM Storms. How much intrest, when, etc. (Hudson & Kozyra?)



GEM Inner Magnetosphere Storms Campaign

Actions or Tasks

- Develop and distribute magnetic field models for the GEM Campaign Storms in order to get better phase space densities and account for the Dst effect in observations (WG 1 & 2 collaboration)
- Determine the time dependent plasmapause locations for GEM storms to determine the effect on radiation belt characteristics and potential acceleration mechanisms (WG 1 & 2 collaboration)
- Theoretical comparison of effectiveness of different diffusive transport mechanisms (VLF, ULF, substorm, etc.)
- Assessment of solar wind parameters. Which are the crutial parameters (or combination of parameters)
- Develop better input boundary conditions for RB modeling. Investigate the importance of pre-existing conditions What is the role of the “seed population” from substorms and/or shocks
- Develop and distribute a long-term (years) low-res (≈1 day) database for statistical analysis of RB events (Reeves & Li)